



## SINGLE-CHIP BLUETOOTH<sup>®</sup> 2.1 + EDR WITH INTEGRATED FM TRANSCEIVER

### FEATURES

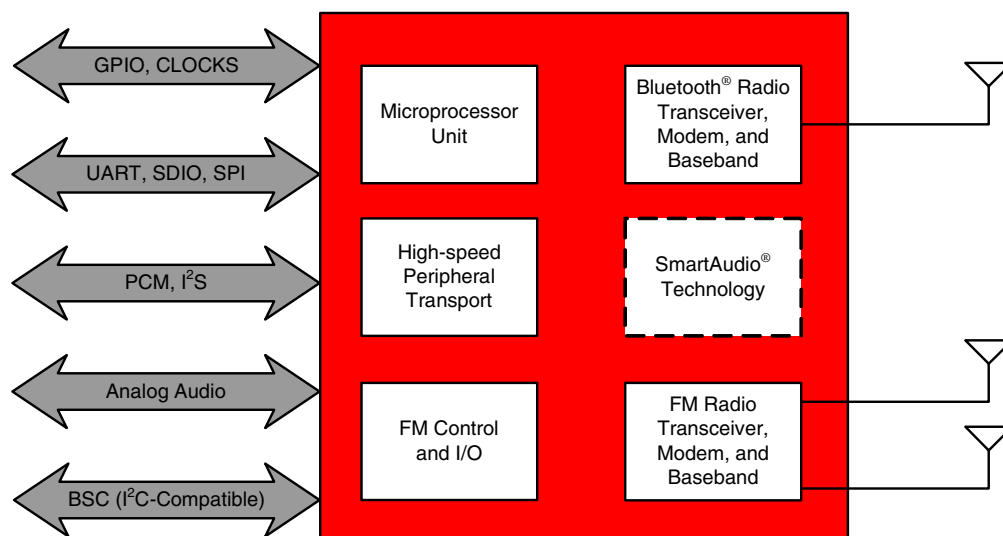
- **Bluetooth**
  - Bluetooth<sup>®</sup> 2.1 + EDR specification compliant
  - On-chip, integrated, Class 1 power amplifier
  - Typical receive sensitivity of -90 dBm
  - SmartAudio<sup>®</sup> technology, improving voice and music quality to Bluetooth headsets
  - Multiple simultaneous Advanced Audio Distribution Profile (A2DP) streams
  - Wideband speech support
  - Low current consumption in all Bluetooth modes
  - WLAN and WiMAX coexistence support
  - Supports high-speed UART (H4, H5), secure digital I/O (SDIO), and serial peripheral interface (SPI)
- **General**
  - Monolithic, 65 nm CMOS, single-die Host Controller Interface (HCI) and FM transceiver integration
  - PCB area requirement less than 40 mm<sup>2</sup>
  - Spurious-free simultaneous operation between Bluetooth and FM receiver/transmitter
  - ROM-based solution with flexible code patching and in-system debugging facility
  - Compatible with Broadcom's Bluetooth + FM device family, which includes the BCM20780 and BCM2048.
  - On-chip low-dropout (LDO) regulators (support direct battery connection)
  - WLBGA and FPBGA packages available

- **FM Transceiver**
  - 65–108 MHz FM+RDS/RBDS band support for world coverage, including OIRT support for Eastern Europe
  - Supports external or internal antenna configurations
  - Host interface flexibility
    - Control: UART, SDIO, SPI, BSC (I<sup>2</sup>C-compatible)
    - Audio: Analog input/output and dual I<sup>2</sup>S ports
  - Superior FM receiver performance with -110 dBm typical sensitivity with a 26 dB SNR
  - Advanced FM channel search algorithms
  - High-power FM transmitter with programmable power control to meet regulatory requirements
  - SmartAudio technology for superior music quality during FM transmission
  - Low power FM receive recording with an on-chip MP3 encoder
  - Supports FM-over-Bluetooth (A2DP), through an on-chip SBC codec, while the host baseband processor is in Sleep mode

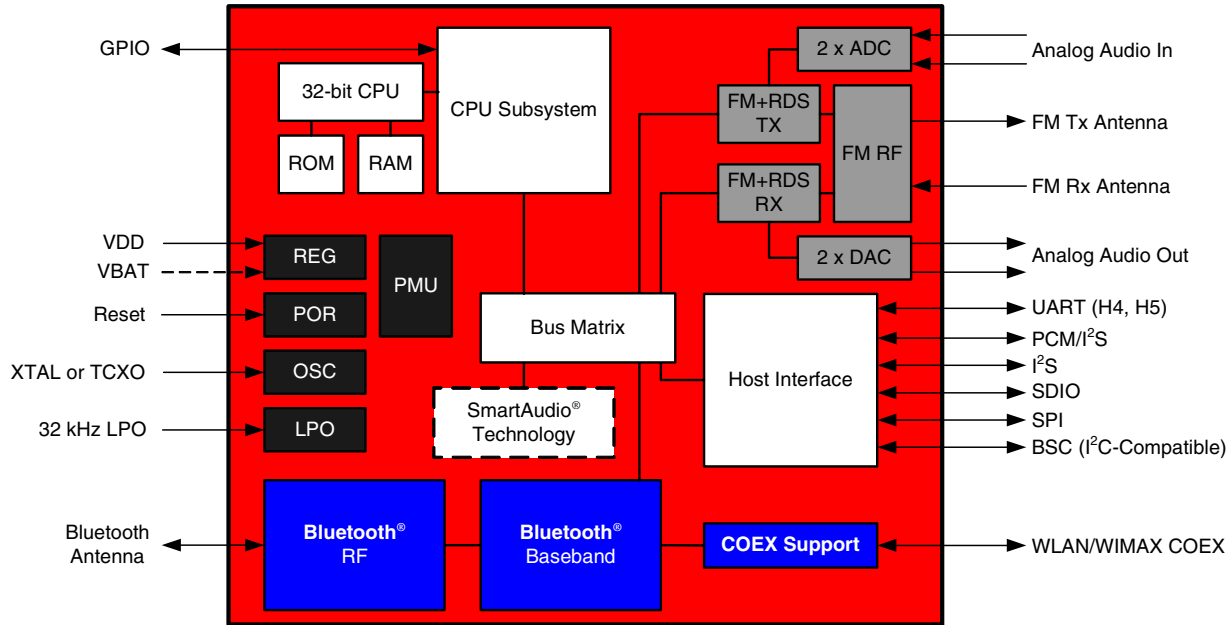
### APPLICATIONS

- Mobile handsets and smartphone
- Personal digital assistant (PDA)
- Portable media players
- Portable navigation devices (GPS)
- Digital satellite radio receivers

### Functional Block Diagram



# OVERVIEW



**BCM2049 Block Diagram**

The Broadcom<sup>®</sup> BCM2049 is a cost-effective solution for portable devices, such as mobile handsets and media players, that require Bluetooth and FM receiver/transmitter functionality. At the software layer, the BCM2049 is backward-compatible with Broadcom's Bluetooth + FM device family, which includes the BCM20780 and BCM2048.

The BCM2049 Bluetooth<sup>®</sup> core is optimized for low current consumption and minimal external bill of materials, while maintaining high receiver sensitivity and up to +10 dBm of transmit output power. The Bluetooth core is fully Bluetooth 2.1 + EDR compliant. SmartAudio<sup>®</sup> technology has also been added to enhance voice quality by supporting packet loss concealment and wideband speech. In conjunction with Broadcom's BTE-Mobile software stack, the BCM2049 supports multiple simultaneous Advanced Audio Distribution Profile (A2DP) streams, enabling music sharing between several stereo Bluetooth headsets.

The BCM2049 includes a feature-rich FM transmitter core that supports programmable transmit frequencies between 76 and 108 MHz to cover worldwide bands. The FM transmitter core has an on-chip, high-output power amplifier with power control, making it possible to optimize FM transmit output power and at the same time complying with US and European regulatory requirements.

The FM transmit function also benefits from the SmartAudio technology built into the BCM2049, such as flexible rate matching, polyphonic tone

generation and mixing, and audio dynamic range control. The FM transmitter core can take its input audio data from stereo line-level analog inputs, an I<sup>2</sup>S port, or a host interface control port. To simplify the generation of a continuous Radio Data System (RDS) data stream, the BCM2049 also includes a flexible RDS and Radio Broadcast Data System (RBDS) transmit preprocessor.

The BCM2049's FM+RDS/RBDS receiver core supports frequencies down to 65 MHz for the Eastern European OIRT band and use with an internal or external FM antenna. By supporting the internal FM antenna, the BCM2049 makes it possible to listen to FM radio over Bluetooth headsets without requiring an additional antenna attachment. To reduce system current consumption when operating in this mode, the BCM2049 has an on-chip, Subband Codec (SBC) encoder. The SBC encoder compresses the received FM audio signal into A2DP packets, without host intervention. The BCM2049 also supports FM recording with on-chip MP3 encoding.

Applying Broadcom's experience in real-world FM broadcast receiver environments, the BCM2049 employs advanced FM search algorithms. To minimize the printed circuit board (PCB) footprint and lower system cost, all external components related to the FM VCO are integrated into the BCM2049. The BCM2049 is available in a space-saving 0.4 mm ball pitch WLBGA package for either chip-on-board or module applications. A 0.5 mm ball pitch BGA package is also available.

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2049-PB05-R 04/24/09

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